

D4
Cont

--23. A spindle motor for a disk driving device according to claim 17, wherein the spindle motor is for a hard disk drive.--

REMARKS

Claims 9-23 are pending. By this Amendment, the specification has been amended, claims 1-8 have been canceled without prejudice or disclaimer and claims 9-23 have been added. Support for the specification and claims can be found in the original drawings, as a description has been provided for the disclosed features. No new matter has been added.

The attached Appendix includes a marked-up copy of each rewritten paragraph (37 C.F.R. §1.121(b)(1)(iii)) and claim (37 C.F.R. §1.121(c)(1)(ii)).

The rejection of claims 1-8 under 35 U.S.C. §103(e) over Suzuki et al., U.S. Patent No. 5,866,961 has been rendered moot by cancellation of claims 1-8. However, Applicants traverse any future rejection of claims 9-23 over Suzuki et al.

Applicants assert Suzuki et al. fail to disclose or suggest Applicants' spindle motor for a disk driving device wherein the housing and the rotor are made of a super engineering plastic material and are unitarily formed by injection molding as recited in claims 9 and 17.

Although Suzuki et al. disclose a spindle motor with a housing 53 made of a synthetic resin such as a liquid crystal polymer resin (col. 2, lines 34-35), the rotor 63 comprises a rotor yoke 59 made of a soft iron plate and a hub base 56 (col. 3, lines 14-17 and lines 23-25). Applicants assert it is neither taught nor suggested in Suzuki et al. to disclose a housing or a rotor made of a super engineering plastic material as recited in Applicants' claims 9 and 17. In Suzuki et al., only the rotor yoke 59 of rotor 63 is disclosed as being made of a particular material (i.e. soft iron plate) with the housing 53 made of a synthetic resin. Applicants assert these materials do not correspond to Applicants' super engineering plastics as described in Applicants' specification and further defined in Applicants' claims 10 and 18.

Applicants' claimed invention is advantageous in making the housing and the rotor of a super engineering plastic such that the disk driving device emits a low level of noise, is lightweight and is mechanically simple and inexpensive to manufacture. Furthermore, by making the housing of a super engineering plastic material, the electric supplying connector portion can be embedded or inserted in the housing and by making the rotor of a super engineering plastic, the inertia of the rotor can be reduced because the rotor is of a reduced weight.

Applicants also assert Suzuki et al. fail to disclose Applicants' double row ball bearing comprising a sleeve outer ring, a plurality of first balls, a plurality of second balls, an inner ring and a shaft as recited in claim 19. Suzuki et al. fail to disclose Applicants' double row ball bearing because Suzuki et al. only disclose individual ball bearings 54 which are separated by spacers.

In addition, claims 10-16 and 18-23 recite additional features of the invention and are also believed to be allowable at least for the reasons discussed above with respect to claims 9 and 17 and for the additional features recited therein.

In view of the foregoing amendments and remarks, Applicants submit that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 9-23 are earnestly solicited.

Should the Examiner believe anything further would be desirable to place the application in better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,



James A. Oliff
Registration No. 27,075

Scott M. Schulte
Registration No. 44,325

JAO:SMS/sxb

Attachment:
Appendix

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OLIFF & BERRIDGE, PLC
P.O. Box 19928
Alexandria, Virginia 22320
Telephone: (703) 836-6400

DEPOSIT ACCOUNT USE
AUTHORIZATION
Please grant any extension
necessary for entry;
Charge any fee due to our
Deposit Account No. 15-0461

APPENDIX

Changes to Specification:

The following is a marked-up version of the amended paragraphs:

Page 1, lines 15-23:

The rotor 1 comprises a circular disk putting face 1a, around its circumferential end portion, an outer circumferential cylinder portion a downwardly depending flange 1b is formed in unitary manner. And, on an inner wall of the outer circumferential cylinder portiona downwardly depending flange 1b, a magnet 1c is mounted. In the illustrated example, although the shaft 2 is pressed in and fixed on the central portion of the rotor 1, there is another example in which the shaft 2 is formed in a unitary manner with the rotor 1. Now, since the spindle motor shown is for a ZIP, on the disk putting face 1a too, a magnet 1d for functioning as a disk clamer is provided.

Page 1, lines 24-32:

Further, in the spindle motor shown in Fig. 1, in order to increase a rotation precision of the rotor 1, two bearings 3 are used so as to clamp a spacer 4. In the housing 5 with a cylindrical projection portion 12 to be fixed with an outer ring of the bearing 3, a stator 6 is fixed with a coil 6a and stack 6b. A copper wire lead wire 7 to supply electricity to a coil 6a supported at the stator 6 is connected to a flexible printed circuit board (FPC) 8 through an opening 5a formed on the housing 5. Further, the spindle motor for disk driving device comprises identical structure in general not limited to the one for ZIP.

Page 4, lines 11-29:

Further, for instance, it becomes easier to mold the housing 5 and the spacer 4 between the two bearings 3, and it can be intended to reduce the numbers of the components of the spindle motor and the assembling processes. In addition, the housing 5 and the electric supplying connector can be molded in a unitary manner, thereby the identical effect can be

obtained. And, in the conventional metal made housing, it has been necessary to conduct an insulating measures such as covering the ~~copper wire~~lead wire 7 with insulating tube, interposing an insulator between the opening 5a of the housing and inserting an insulating shim between the coil 6a and the housing 5, however, according to the embodiment of the present invention, since the housing 5 itself has an insulating property, such measures are adapted to become unnecessary. As a result, the cost of the parts to be used for the insulating measures and the number of assembling processes are reduced and the cost for the spindle motor can be reduced. In addition, since the corrosion protection is not necessary to the housing, from this point too, comparing with the conventional metal made housing, the production cost can be held low.

Page 5, line 31 - page 6, line 7:

In Fig. 2, so-called "shaft fixed type" spindle motor is shown, in which the shaft 2, with an inner raceway groove 30, is fixed ~~in an annular hole of~~ on the housing 5 ~~having a~~ cylindrical projection portion 12, and the rotor 1 is supported on the shaft 2 through the bearing 3. The spindle motor of Fig. 2 is formed in such a manner as the outer rings of the two bearings 3 is made in a unitary manner to omit the spacer 4 which is used in the "shaft rotary" type of spindle motor and the inner ring of the bearing 3 positioned lower is formed with the shaft 2 in a unitary manner. The motor of Fig. 2 includes a stator 6 with a stack 6b and coils 6a wound around the stack 6b, with the stator 6 mounted on a outer circumference of the cylindrical projection portion 12 of the housing 5 to confront the magnet 1c. The spindle motor also a lead wire 7 of the coils 6a connected to an electric supplying connector portion 14. The rotor 1 has a central hole and a downwardly depending flange 1b at an outer periphery thereof. The magnet 1c is disposed on an inner peripheral surface of the downwardly depending flange 1b of the rotor 1 with the rotor 1 supported rotatably relative to the housing 5 by a bearing device. The bearing device is a double row ball bearing with a

sleeve outer ring 10, a plurality of first balls 16, a plurality of second balls 18, an inner ring 22 and the shaft 2. The sleeve outer ring 10 has a pair of outer raceway grooves 24 on an inner circumference surface of the sleeve outer ring 10. The shaft 2 has a small diameter portion 26 and a large diameter portion 28 formed with an inner raceway groove 30 on the outer circumference surface of the large diameter portion 28. The inner ring 22 is fixed on the small diameter portion 26 of the shaft 2. The first balls 16 are disposed between one outer raceway groove 24 of the sleeve outer ring 10 and an inner raceway groove 20 formed on an outer circumference surface of the inner ring 22 with the inner raceway groove 20 formed on the outer circumference surface of the inner ring 22. The second balls are disposed between the other outer raceway groove 24 of the sleeve outer ring 10 and the inner raceway groove 30 of the large diameter portion 28 of the shaft 2. The large diameter portion 28 of the shaft 2 is fitted in the annular hole of the housing 5. The sleeve outer ring 10 is fitted in the central hole of the rotor 1 with one end portion of sleeve outer ring 10 located in the cylindrical projection portion 12. Further, since the spindle motor shown in Fig. 2 is not for ZIP, the disk putting face 1a of the rotor 1 is not provided with the magnet 1d to function as a disk clamer. Further, the parts or portions identical with or relevant to the ones in Fig. 1 are indicated identically.

Changes to Claims:

Claims 1-8 are canceled.

Claims 9-23 are added.